COVERAGE NAME : HYDRO

COVERAGE AREA: COUNTY

COVERAGE DESCRIPTION:

The hydrography layer originally came from the USGS in digital line graph (DLG-3) data format. DLG-3 data were captured from 1:100,000-scale maps by manual digitizing and raster scanning. There are approximately 3200 DLG files represented in the statewide hydrography data layer.

The hydrography layer consists of all flowing waters, standing waters, and wetlands--- both natural and manmade. The coverages contain two separate feature types: polygons (areas) and lines. Polygon features have attribute codes that identify water bodies such as lakes, wide river segments, or swamps. Line features have attribute codes that represent streams or shorelines.

Edits to the original linework have been made during the data conversion by Teale from the original DLG-3 format to the Arc/INFO(tm) GIS format. Such changes include line movements (due to the map edge-matching process), minor corrections of attribute coding, and the closing of open polygons. Flow direction for streams (type line) has also been added. Stream lines are flagged (where item FLOW = 1) to indicate whether or not the direction of a given stream (line) has been defined and/or verified by Teale.

County lines (a separate Teale data layer) and hydrography lines are not reconciled with each other and discrepancies between the two will occur when a county boundary follows a water feature.

Hydrography of the entire state is stored in 33 separate ARC/INFO coverages or tiles, whose individual boundaries correspond to the USGS 1:250,000-scale quad series (see index coverage called hydroindexa and index diagram below). Coverage names consist of two unique characters plus a suffix -JHYSA. Most of the two-letter codes abbreviate a quad name, for example: RDJHYSA, for the Redding quad. The tiles are also numbered from 1 to 33, northwest to southeast, and this numeric code is contained in the item HYSNUM. A separate item, HSCKEY, contains a number unique to each arc within a tile. Both the HYSNUM and HSCKEY items are contained in the coverage's Arc Attribute Table (AAT).

In 1992, the Teale hydrography data layer was sent to US EPA for use in their River Reach File system version 3, also known as Reach File 3 or RF3-alpha. RF3 is US EPA's national hydrographic addressing system which contains unique location and connectivity codes, water feature names, and update documentation. This system was developed by Horizon Systems Corporation, under contract to the US EPA Office of Water. RF3 as archived at Teale consists of US EPA-generated data tables, designated by the filename extension .DS2 (for example: RDJHYSA.DS2). The DS2 file is stored as an 'external' data table within the hydro workspace's INFO subdirectory.

There are two ways to link the RF3 records in the DS2 files with the hydrography arc attribute tables (AAT). The first involves the item RF3RCHID, which is a concatenated string consisting of three fields: the USGS Cataloging Unit (CU, an 8-digit watershed code), a numeric stream segment identifier (SEG), and a Marker Index (MILE), an item indicating relative upstream position along a given SEG. The second way to link the DS2 and the AAT is on the HSCKEY item described above. The RF3RCHID and HSCKEY items are present in the Teale versions of both the DS2 and AAT files. Note: the most reliable primary key for individual hydrography features consists of HYSNUM combined with HSCKEY.

VITAL STATISTICS:

Datum:	NAD 83
Projection:	Albers
Units:	Meters
1st Std. Parallel:	34 00 00
2nd Std. Parallel:	40 30 00
Longitude of Origin:	-120 00 00
Latitude of Origin:	00 00 00
False Easting (X shift):	0
False Northing (Y shift):	-4,000,000
Source:	USGS DLG-3 (optional format)
Source Media:	Magnetic tape (80 byte records)
Source Projection:	Universal Transverse Mercator
	UTM Zones 10 & 11
Source Units:	Meters
Source Scale:	1:100,000
Capture Method:	Scanned, digitized
Conversion Software:	ARC/Info rev 5.0.1
Data Structure:	Vector
ARC/INFO Coverage Type:	NET (Line, polygon)
ARC/INFO Precision:	Double
ARC/INFO Tolerances:	0 to 200 meters
Number of Features:	16,077
Layer Size:	116.970 MB
Data Updated:	September 1993 (added RF3 line feature table) (other unscheduled updates have been made, see original log file in Teale workspace)

DATA DICTIONARY:

DATAFILE NAME: HYDRO.AAT   where xx = tile code (see index)
RECORD LENGTH: 98

Non-standard LINE attribute fields:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC
33	MAJOR1	4	6	B	-
37	MINOR1	4	6	B	-
41	MAJOR2	4	6	B	-
45	MINOR2	4	6	B	-
49	MAJOR3	4	6	B	-
53	MINOR3	4	6	B	-
57	MAJOR4	4	6	B	-
61	MINOR4	4	6	B	-
65	MAJOR5	4	6	B	-
69	MINOR5	4	6	B	-
73	FLOW	1	1	I	-
74	HSCKEY	6	6	I	-
80	HYSNUM	2	2	I	-
82	RF3RCHID	17	17	C	-

NOTE: Items common to all LINE coverages: FNODE#, TNODE#, LPOLY#, RPOLY#, LENGTH, HYDRO# and HYDRO-ID are not described here; with one exception:

HYDRO-ID: where User ID negative (<0), arc is an artificial neatline (coverage or tile boundary).

FLOW: If equal to 1, flow direction is defined; if equal to 0, no direction is defined.

HSCKEY: Unique sequence number. Item was created for EPA's Reach File System. Use HSCKEY to relate to the RF3 DS2 data file of a given tile (see HYSNUM below).

HYSNUM: Hydrography quad tile sequence number; 1 through 33. Item was created for EPA's Reach File System; combine with HSCKEY to uniquely code features across tiles.

RF3RCHID: Primary key of RF3; concatenates CU, SEG, MILE; see desrciption of HYDRO.DS2 files below.

MAJOR1-5: Major codes denote hydrography (code 50) as the major feature category to which a line element belongs (as opposed to property boundaries, roads, etc within DLGs).

MINOR1-5: Minor codes assign up to five descriptive subcategories to any single hydrography line element.

Major Code #	Minor Code #	Element Description
50	200	Shoreline
50	201	Man-made shoreline
50	202	Closure line
50	203	Indefinite shoreline
50	204	Apparent Limit
50	205	Outline of a Carolina bay
50	206	Danger curve
50	400	Rapids
50	401	Falls
50	402	Gravel pit/quarry filled w/water
50	403	Gaging station
50	404	Pumping station
50	405	Water intake
50	406	Dam or weir
50	407	Canal lock or sluice gate
50	408	Spillway
50	409	Gate(flood,tidal,head,check)
50	410	Rock
50	411	Crevasse
50	412	Stream
50	413	Braided stream
50	414	Ditch or canal
50	415	Aqueduct
50	416	Flume
50	417	Penstock
50	418	Siphon
50	419	Channel in water area
50	420	Wash or ephemeral drain
50	421	Lake or pond

50	422	Coral reef
50	423	Sand in open water
50	424	Spoil area
50	425	Fish ladders
50	601	Underground
50	602	Overpassing
50	603	Elevated
50	604	Tunnel
50	605	Right bank
50	606	Left bank
50	607	Under construction
50	608	Salt
50	609	Unsurveyed
50	610	Intermittent
50	611	Abandoned or discontinued
50	612	Submerged or sunken
50	613	Wooded
50	614	Dry
50	615	Mineral or hot (sulphur,alkali,etc.)
50	616	Navigable transportation
50	617	Underpassing
50	618	Earthen construction
50	000	Photorevised feature
05N	---	Water surface elevation, actual or interpolated.

N = elevation units
 1=feet
 2=meters
 6=feet below datum
 7=meters below datum

053	---	Angle of clockwise rotation (nearest whole degree)
055	---	River mile, value in four spaces, right justified
058	000	Best estimate of classification or position
059	0--	Coincident feature

DATA DICTIONARY:

DATAFILE NAME: HYDRO.DS2   where xx = tile code (see index)
RECORD LENGTH: 450

Non-standard LINE attribute fields:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	CU	8	8	I	-	Catalog Unit
9	SEG	4	4	I	-	Segment No.
13	MILE	5	5	N	2	Mile Point
18	UPMI	5	5	N	2	Upstream Mile Pt.
23	RFLAG	1	1	C	-	Reach Flag
24	OWFLAG	1	1	C	-	Open Water Flag
25	TFLAG	1	1	C	-	Terminal Flag
26	SFLAG	1	1	C	-	Start Flag
27	REACHTYPE	1	1	C	-	Reach Type Code
28	LEVEL	2	2	I	-	Stream Level
30	JUNC	2	2	I	-	Downstream Rch Lvl
32	DIVERGENCE	1	1	I	-	Divergence Code
33	USDIR	1	1	C	-	Upstream Direction
34	TERMID	5	5	I	-	Terminal Stream ID
39	TRMBLV	1	1	I	-	Terminal Base Level
40	PNAME	30	30	C	-	Primary Name
70	PNMCD	11	11	C	-	Primary Name Code
81	CNAME	30	30	C	-	Complement Name
111	CNMCD	11	11	C	-	Complement Name Code
122	OWNAME	30	30	C	-	Open Water Name
152	OWNMCD	11	11	C	-	Open Water Name Code
163	DSCU	8	8	I	-	Downstream CU
171	DSSEG	4	4	I	-	Downstream SEG
175	DSMI	5	5	N	2	Downstream MI
180	CCU	8	8	I	-	Complement CU
188	CSEG	4	4	I	-	Complement SEG
192	CMILE	5	5	N	2	Complement MI
197	CDIR	1	1	C	-	Complement Direction
198	ULCU	8	8	I	-	Upstream Left CU
206	ULSEG	4	4	I	-	Upstream Left SEG
210	ULMI	5	5	N	2	Upstream Left MI
215	URCU	8	8	I	-	Upstream Right CU
223	URSEG	4	4	I	-	Uppstream Right SEG
227	URMI	5	5	N	2	Upstream Right MI
232	SEGL	6	6	N	2	Reach Length (Miles)
238	RFORGFLAG	1	1	I	-	RF Origin flag(1-3)
239	ALTPNMCD	8	8	I	-	Alt. Prime Name Code
247	ALTOWNMC	8	8	I	-	Alt. OW Name Code
255	DLAT	8	8	N	4	Downstream Latitude
263	DLONG	8	8	N	4	Downstream Longitude
271	ULAT	8	8	N	4	Upstream Latitude
279	ULONG	8	8	N	4	Upstream Longitude
287	MINLAT	8	8	N	4	Minimum Latitude
295	MINLONG	8	8	N	4	Minimum Longitude
303	MAXLAT	8	8	N	4	Maximum Latitude
311	MAXLONG	8	8	N	4	Maximum Longitude

319	NDLGREC	4	4	I	-	No. of DLG Records
323	Ln1AT2	4	4	I	-	DLG Line Attribute 1
327	Ln2AT2	4	4	I	-	DLG Line Attribute 2
331	AR1AT2	4	4	I	-	DLG Area Attribute
335	AR1AT4	4	4	I	-	DLG Area Attribute
339	AR2AT2	4	4	I	-	DLG Area Attribute
343	AR2AT4	4	4	I	-	DLG Area Attribute
347	UPDATE1	6	6	C	-	Updt Date #1(MMDDYY)
353	UPDTCD1	8	8	C	-	Updt Type Code #1
361	UPDTSRC1	8	8	C	-	(This field set to correspond to Teale DLG dataset ids-See HYSNUM and HSCKEY)
369	UPDATE2	6	6	C	-	Updt Date #2(MMDDYY)
375	UPDTCD2	8	8	C	-	Updt Type Code #2
383	UPDTSRC2	8	8	C	-	Updt Source #2
391	UPDATE3	6	6	C	-	Updt Date #3(MMDDYY)
397	UPDTCD3	8	8	C	-	Updt Type Code #3
405	UPDTSRC3	8	8	C	-	Updt Source #3
413	DIVCU	8	8	I	-	Divergent CU
421	DIVSEG	4	4	I	-	Divergent SEG
425	DIVMI	5	5	N	2	Divergent MI
430	DLGID	6	6	I	-	DLG Number (special use)
436	FILLER	7	7	C	-	Filler for Future use
443	HSCKEY	6	6	I	-	(Added by Teale-Value is same as last 6 digits of UPDTSRC1- Relate key to the AAT file)
449	HYSNUM	2	2	I	-	(Added by Teale- Value same as first 2 digits of UPDTSRC1- Hydro quad sequence number 1-33)

** REDEFINED ITEMS **

1	RF3RCHID	17	17	C	-	(Reach number that uniquely identifies all reaches)

DATA DICTIONARY:

    DATAFILE NAME: HYDRO.PAT
    RECORD LENGTH: 56

Non-standard POLYGON attribute fields:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC
25	MAJOR1	4	6	B	-
29	MINOR1	4	6	B	-
33	MAJOR2	4	6	B	-
37	MINOR2	4	6	B	-
41	MAJOR3	4	6	B	-
45	MINOR3	4	6	B	-
49	MAJOR4	4	6	B	-
53	MINOR4	4	6	B	-

NOTE: Items common to all POLYGON coverages: AREA, PERIMETER, HYDRO# and HYDRO-ID are not described here.

MAJOR1-4: Major codes denote hydrography (code 50) as the major feature category to which an area element belongs.

MINOR1-4: Minor codes assign up to four descriptive subcategories to any single hydrography area element.

Major Code #	Minor Code #	Element Description
50	100	Alkali flat
50	101	Reservoir
50	102	Covered reservoir
50	103	Glacier or permanent snowfield
50	104	Salt evaporator
50	105	Inundation area
50	106	Fish hatchery or farm
50	107	Industrial water impoundment
50	108	Area to be submerged
50	109	Sewage disposal pond/filtration bed
50	110	Tailings pond
50	111	Marsh, wetland,swamp,bog
50	112	Mangrove area
50	113	Rice Field
50	114	Cranberry bog
50	115	Flats(tidal,mud,sand,gravel)
50	116	Bays,estuaries,gulfs,oceans,seas
50	117	Shoal
50	118	Soda evaporator
50	119	Duck pond
50	400	Rapids
50	401	Falls
50	402	Gravel pit/quarry filled w/water
50	403	Gaging station
50	404	Pumping station

50	405	Water intake
50	406	Dam or weir
50	407	Canal lock or sluice gate
50	408	Spillway
50	409	Gate(flood,tidal,head,check)
50	410	Rock
50	411	Crevasse
50	412	Stream
50	413	Braided stream
50	414	Ditch or canal
50	415	Aqueduct
50	416	Flume
50	417	Penstock
50	418	Siphon
50	419	Channel in water area
50	420	Wash or ephemeral drain
50	421	Lake or pond
50	422	Coral reef
50	423	Sand in open water
50	424	Spoil area
50	425	Fish ladders
50	601	Underground
50	602	Overpassing
50	603	Elevated
50	604	Tunnel
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50	606	Left bank
50	607	Under construction
50	608	Salt
50	609	Unsurveyed
50	610	Intermittent
50	611	Abandoned or discontinued
50	612	Submerged or sunken
50	613	Wooded
50	614	Dry
50	615	Mineral or hot (sulphur, alkali,etc.)
50	616	Navigable transportation
50	617	Underpassing
50	618	Earthen construction
50	000	Photorevised feature

DATA QUALITY ASSESSMENT:

The following are subjective comments regarding this data.

The USGS DLG features of this layer are fairly complete. The density of line work representing drainage networks appears to vary arbitrarily from quad to quad, and there are discontinuities in lines depicting streams at the edges of 100k quads. The geographic feature accuracy is fair. Contiguous features are not always matched across map sheet boundaries. The attribute completeness and accuracy is good. The US EPA River Reach file as archived at Teale is an alpha release (prototype). As such, users are cautioned to verify drainage network connectivity and water feature names before undertaking extensive processing using RF3 data.

SUPPLEMENTARY INFORMATION (courtesy of Department of Fish & Game)

In 1993, US EPA changed the DS2 file designator to DS3 and changed the MILE and related items from numeric type to character type. No data content changes were made. At this writing, the hydrography layer is archived with the DS2 files.

The DS2 / DS3 item UPDTSRC1 concatenates HYSNUM and HSCKEY for those records that have a corresponding AAT record. UPDTSRC1 contains the value 9999 for DS2 / DS3 records created by US EPA that have no corresponding record in the hydrography layer. UPDTSRC1 contains leading zeroes for single-digit HYSNUM values.

INDEX TO 1:100,000 DLG HYDROGRAPHY

ARC/INFO coverage names are composed of the prefixes shown in the statewide grid below (some are abbreviations of the USGS 1:250,000-scale quad map series names), plus the suffix JHYSA for the line and polygon data layers (for example, RDJHYSA, for the Redding quad).

The item HYSNUM in the ARC/INFO feature attribute tables contains the indicated numeric values to reference the tile within which a given feature falls.

```
                                      HYSNUM   QUAD NAME
        126    124    122    120W
42N    _____       OREGON  ____            1     CRESCENT CITY
       | ZF  |  WE  | AC  |                2     WEED
       |  1  |   2  |  3  | N              3     ALTURAS
41     |_____|_____|_____| E            4     EUREKA
       | EA  | RD   | XJ  | V              5     REDDING
       |  4  |  5   |  6  | A              6     SUSANVILLE
40     |_____|_____|_____| D            7     UKIAH
                 | UK  | CQ  | A           8     CHICO
                 |  7  |  8  |     118     9     SANTA ROSA
39               |_____|_____|            10     SACRAMENTO
                 | X9  | SO  | WK  |       11     WALKER LAKE
                 |  9  |  10 |  11 |   116 12     SAN FRANCISCO
38               |_____|_____|_____|       13     SAN JOSE
                 | SF  | SJ  | MZ  | GU  | 14     MARIPOSA
                 | 12  | 13  | 14  |  15 | 15     GOLDFIELD
37               |_____|_____|_____|_____| 16     (no USGS name)
                 | SX  | ZP  | FO  | DV  | 17     MONTEREY
                 | 16  | 17  | 18  | 19  |  114 18  FRESNO
36               |_____|_____|_____|_____|     19  DEATH VALLEY
                       | SL  | BF  | TJ  | KI  | 20  SAN LUIS OBISPO
                       | 20  | 21  | 22  | 23  | 21  BAKERSFIELD
35                     |_____|_____|_____|_____| A 22  TRONA
                       | SM  | LA  | SB  | NE  | R 23  KINGMAN
                       | 24  | 25  | 26  | 27  | I 24  SANTA MARIA
34                     |_____|_____|_____|_____| Z 25  LOS ANGELES
                       | SV  | LB  | SN  | S6  | O 26  SAN BERNARDINO
                       | 28  | 29  | 30  | 31  | N 27  NEEDLES
33                     |_____|_____|_____|_____| A 28  SANTA ROSA ISLAND
                             | SD  | EL  |         29  LONG BEACH
                             | 32  | 33  |         30  SANTA ANA
                       |---------------------|     31  SALTON SEA
32                     |---------------------|     32  SAN DIEGO
                              MEXICO               33  EL CENTRO
```

Each quad covers an area one degree of latitude by two degrees of longitude, except as noted: ZF, WE, AC, XJ, and CQ coverage boundaries have been extended to include hydrographic features between the quad lines and the State Boundary; SD and SV include Channel Islands; no Teale data beyond the Mexico border (---).

See the coverage hydroindexa in /tlib/hydro for a gis version of this index map.